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SPECIFICATION FOR INSULATING MATERIALS BASED ON BUILT-UP MICA OR TREATED MICA PAPER

PART III SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 1 Rigid Mica Materials for Commutators Separators

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Indian Standard

SPECIFICATION FOR INSULATING MATERIALS BASED ON BUILT-UP MICA OR TREATED MICA PAPER

PART III SPECIFICATIONS FOR INDIVIDUAL MATERIALS

Section 1 Rigid Mica Materials for Commutators Separators

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 29 October 1979, after the draft finalized by the Electrical Insulation Sectional Committee had been approved by the Electrotechnical Division Council.

0.2 This standard deals with built-up mica or treated mica paper for use in electrical equipment. It consists of the following three parts:

Part I Definitions and General Requirements,
Part II Methods of Test, and
Part III Specifications for Individual Materials.

0.3 This standard (Part III/Sec 1) covers requirements for rigid mica materials for commutators separators.

0.4 In the preparation of this standard, assistance has been derived from Publication 371-3-1 (1973) Specification for insulating materials based on built-up mica or treated mica paper: Part 3 Specifications for individual materials: Sheet 1 : Rigid mica materials for commutator separators, issued by the International Electrotechnical Commission (IEC).

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part III/Sec 1) applies to rigid mica sheets for commutator separators supplied either as sheets or as separators cut to size.

1.2 The thickness of the sheets is from 0·3 mm to 2 mm and they are made of muscovite or phlogopite mica built-up from bonded splittings.

2. GENERAL REQUIREMENTS

2.1 The material as supplied shall be of uniform hardness, free from soft patches and foreign matter.

2.2 The bonding medium used shall be agreed between supplier and purchaser. The material when tested in accordance with the methods given, shall comply with all the requirements of this specification.

3. MARKING

3.1 When commutator separators are delivered in stacks, each stack shall be marked with the nominal thickness of the separators and the number of separators in the stack.

3.2 When commutator separators are required to be delivered in gauged stacks (*see* **4.2**), each stack shall be marked with the nominal thickness of the separators, the number in the stack and the stack height.

3.3 For other forms of delivery, the nominal thickness (*see* **4.1**) and the number of separators or sheets shall be stated.

4. THICKNESS

4.1 Rigid mica material shall be supplied either as sheets or strips or small separators cut to size with an area less than or equal to 10 cm^2.

4.1.1 *Apparatus* — The thickness of the material as received shall be measured with an apparatus in accordance with **2.1** of Part II of this standard.

The pressure exerted on the specimens shall be 10 N/cm^2 to 600 N/cm^2 or as mutually agreed to between the purchaser and the supplier.

4.1.2 *Test Specimens* — The test specimens shall be in accordance with **2.2** of Part II of this standard.

4.1.3 *Procedure*

4.1.3.1 *Sheets and strips* — For sheets, ten measurements shall be made at points uniformly distributed over the specimens; for strips, at ten regular intervals along a line approximately in the middle of the length of the strip.

The following shall be reported:

a) The average thickness (the arithmetic average of the ten measurements) of each test specimen.

b) The number of measurements out of tolerance.

c) The average thickness of all test specimens taken from one batch and to be considered as the average thickness of the batch.

NOTE — A strip is a length of material with a width of 200 mm, *max*.

4.1.3.2 *Small separators with an area less than or equal to 10 cm²* — The specimen is ten separators. One measurement shall be made on each separator. The average of the measurements made on ten separators shall be taken as the average of the specimen.

4.1.4 *Tolerances of Sheets, Strips and Separators ($\leqslant$ 10 cm²)* — The tolerances related to the nominal value are:

	Normal	*Close*
a) Average	±0·03 mm	±0·02 mm
b) 90 percent of individual results within	±0·04 mm	±0·03 mm
c) 100 percent of individual results within	±0·05 mm	±0·04 mm

Close tolerances apply only to specially ground strips and separators.

4.2 Commutator Separators with an Area Greater than 10 cm²

4.2.1 *Procedure*

4.2.1.1 The thickness measurement on commutator separators shall be made under a pressure of 3 000 N/cm² on stacks of at least 20 separators, or as agreed to between the purchaser and the supplier.

4.2.1.2 When commutator separators over 10 cm² in area are not required to be stack gauged, they shall comply with the requirements of **4.1.3.1** and **4.1.4**.

4.2.1.3 The separators may, if desired, be interleaved by a piece of densified paper with a thickness of about 0·02 mm.

4.2.1.4 All the separators in the stack to be tested shall be aligned, and the stack subjected to a pressure of 3 000 N/cm^2 in a direction perpendicular to the surface of the separators and uniformly distributed over the surface of the separators.

4.2.1.5 The measurement is made at a temperature in the range of 15°C to 35°C with an accuracy of 0·05 mm on a press with plane parallel plates.

4.2.1.6 The thickness *d* of a stack is given by:

$$d = d_1 - d_2$$

where

d_1 = thickness of a stack of *n* separators and (*n* — 1) interleaves, and

d_2 = total thickness of (*n* — 1) interleaves obtained by measuring a stack of (*n* — 1) interleaves with a surface of 0·01 m^2 placed on a steel block with a surface of 0·01 m^2 and a height of 60 mm under a pressure of 3 000 N/cm^2.

Note — If no interleaves are used, the second measurement is done with the steel block only for reasons of checking the deformation of the press.

4.2.1.7 When required by the purchaser, the thickness of the individual separators in selected stacks shall be checked by the procedure of **4.1**.

4.2.1.8 The difference between the maximum and the minimum thickness of any individual separator shall not be greater than 0·08 mm.

Note — The thickness measured here is not the same as the thickness measured according to **4.1** due to the different pressures used.

4.2.2 *Tolerances* — The tolerances shall be as follows:

a) Average for an entire consignment	±0·01 mm
b) Average for an individual stack	±0·02 mm

5. OTHER DIMENSIONS

5.1 The other dimensions are only checked on commutator separators by any suitable means with an accuracy of 0·05 mm.

5.2 Tolerances — The following tolerances shall be accepted:

a) Height, *h* (*see* Fig. 1)	+0·3 mm —0·5 mm
b) Other dimensions	±0·5 mm

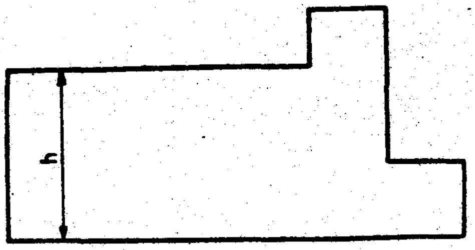

FIG. 1 DIAGRAM OF A COMMUTATOR SEPARATOR

6. OTHER REQUIREMENTS

6.1 Further requirements for mica materials for commutator separators are given in Table 1.

TABLE 1 REQUIREMENTS FOR MATERIALS BASED ON BUILT-UP MICA FOR COMMUTATOR SEPARATORS

DESCRIPTION (1)	NOMINAL THICKNESS (2) mm	MINIMUM MICA CONTENT (3) Percent	STABILITY UNDER HEAT & PRESSURE (*see* NOTE) (4) °C	ELASTIC COMPRESSION (5) Percent	TEMPERATURE OF COMPRESSION MEASUREMENT (6) °C
1. Punching quality base sheet, muscovite	0·3 to 1·6	92	No requirement	1—5	150
2. Punching quality base sheet, phlogopite					
3. Standard quality base sheet, muscovite	0·5 to 2	96	200	1—4·5	160
4. Standard quality base sheet, phlogopite					
5. 'Traction' quality base sheet, muscovite	0·5 to 2	95	260	1·2—4	200
6. 'Traction' quality base sheet, phlogopite					
Relevant clause number of Part II of this standard	2	3·6	6	5	5

NOTE 1 — The density of all materials is in the range of 2·2 kg/dm³ to 2·6 kg/dm³.

NOTE 2 — The punching and standard qualities are sometimes delivered with two backing papers giving rise to other values of the properties.

NOTE 3 — At the temperature specified, no droplets of binder or displacement of mica should be observed.

7. ELECTRIC STRENGTH

7.1 The mica material should have a minimum break down voltage of 25·0 kV/mm when tested according to **8** of Part II of this standard. 6 mm electrodes as well as 25 mm electrodes may be used.

8. SAMPLING

8.1 Sampling shall be subject to agreement between the supplier and the purchaser.

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